NERRS Estuaries 101 Middle School Curriculum
Activity 10: The Jubilee Phenomenon
Next Generation Science Standards (NGSS) Alignment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. • Develop and use a model to describe phenomena. *Students create a model of a stratified (layered) estuary and observe how layers change.* [Exercise 2] **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. • Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1) *Students analyze graphs to provide evidence to explain when a specific set of environmental conditions is right for a jubilee event.* [Exercise 3] **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. [Exercise 3] • Apply scientific ideas to construct an explanation for realworld phenomena, examples, or events. [Exercise 3]	**LS1.C: Organization for Matter and Energy Flow in Organisms** *This activity illustrates a consequence of eutrophication, and the important role that oxygen and phytoplankton play in marine ecosystems. It is relevant to this DCI, although not directly teaching it.* **LS2.A: Interdependent Relationships in Ecosystems** • Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) *Students study how organisms' behavior and survival are driven by environmental conditions.* **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** • Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) *Students learn about the dynamic nature of ecosystems and disruptions to individual organisms, but in this example the dynamics do not lead to population shifts. This activity relates to this DCI, but not does directly teach all aspects of it.* **ESS2C: The Roles of Water in Earth's Surface Processes** • Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4) *Students learn how sunlight and weather patterns influence local movements of water. This activity can be used to provide a locally relevant research related to this DCI.* • Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6) *As in MS-ESS2-4, this activity provides a local example of the importance of density in marine ecosystems. Exercise 2 could be adapted to teach this DCI very specifically.*	**Patterns** • Patterns can be used to identify cause and effect relationships. *Patterns are drawn from multiple data sources to identify cause and effect relationships.* [Exercise 3] • Graphs, charts, and images can be used to identify patterns in data. [Exercise 3] **Cause and Effect** • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1) *Students use data and understanding of cause and effect to answer questions.* [Exercise 3] **Stability and Change** • Small changes in one part of a system might cause large changes in another part. (MS-LS2-4) [Exercise 1, 2, 3] • Stability might be disturbed either by sudden events or gradual changes that accumulate over time. *Students observe how changes in multiple parameters (weather and water chemistry) drive short-term changes in an ecosystem.* [Exercise 1, 2, 3]